

جمهورية مصر العربية



وزارة التربية والتعليم
والعالم الفنى

نمذج إجابة

امتحان شهادة إتمام الدراسة الثانوية العامة

للعام الدراسي ٢٠١٧/٢٠١٦ - الدور الأول

المادة : الاستاتيكا (باللغة الانجليزية)

نمذج

أ

1-

Answer: (a) $\frac{2}{5}$ \triangle

2-

Answer (c) $]0,1]$ \triangle

3-

(a) $\vec{r} = \vec{BA} = \vec{A} - \vec{B}$
 $\vec{r} = (1, 1, 4) - (2, -3, 1) = (-1, 2, 3)$ \triangle

$\therefore \vec{M}_B = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ -1 & 2 & 3 \\ 2 & 3 & -1 \end{vmatrix} = -11\vec{i} + 5\vec{j} - 7\vec{k}$ \triangle

(The length of perpendicular) $= \frac{\|\vec{M}_B\|}{\|\vec{F}\|} = \frac{\sqrt{121+25+49}}{\sqrt{4+9+1}} = \frac{\sqrt{195}}{\sqrt{14}} \approx 3.73$ length unit \triangle

(b) $\vec{R} = \vec{F}_1 + \vec{F}_2 + \vec{F}_3 = 4\vec{i} - 3\vec{j}$ \triangle

$\vec{M}_B = \vec{BA} \times \vec{R}$
 $= (\vec{A} - \vec{B}) \times \vec{R}$
 $= (-4\vec{i} - 2\vec{j}) \times (4\vec{i} - 3\vec{j})$
 $= (12 + 8)\vec{k}$
 $= 20\vec{k}$ \triangle

$l = \frac{\|\vec{M}_B\|}{\|\vec{R}\|} = \frac{20}{\sqrt{16+9}} = 4$ length unit \triangle

4-

Answer (b) -2 \triangle

5-

Answer: @ - 120 

6-

$$\therefore 400 \sin 30^\circ > 50$$

\therefore The direction of the friction force F is upwards.

$$\therefore 50 + F = w \sin 30^\circ$$

$$50 + F = 400 \times \frac{1}{2}$$

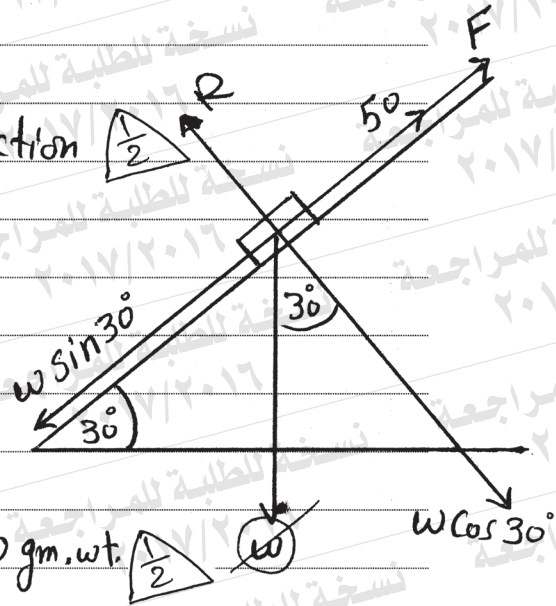
$$F = 200 - 50 = 150 \text{ gm.wt}$$

$$\therefore \mu R = \frac{\sqrt{3}}{4} \times 400 \cos 30^\circ$$

$$\therefore \mu R = \frac{\sqrt{3}}{4} \times 400 \times \frac{\sqrt{3}}{2} = 150 \text{ gm.wt.}$$

$$\therefore F = \mu R$$

\therefore The body is about to move.



7-

Answer @ 10 

8-

Answer: @ 4 

9-

$$R = 12 - 7 = 5 \text{ newton}$$

$$7 \times AC = 12 \times BC$$

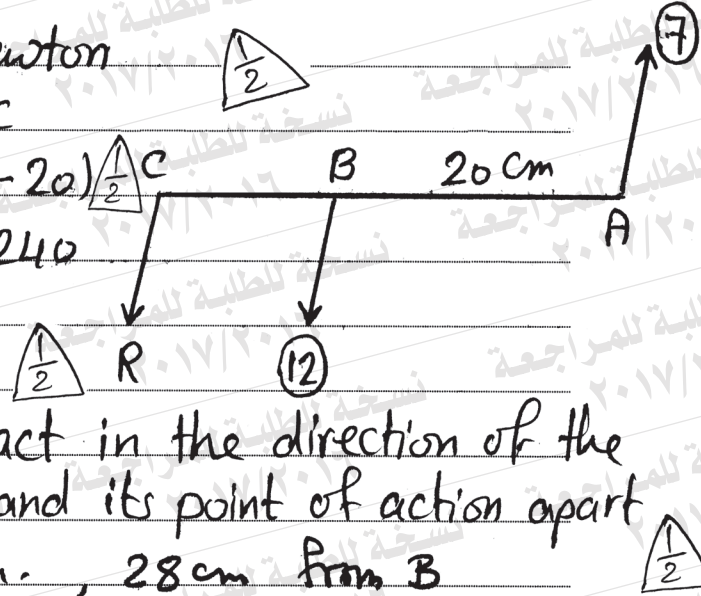
$$7AC = 12(AC - 20)$$

$$7AC = 12AC - 240$$

$$5AC = 240$$

$$AC = 48 \text{ cm}$$

∴ R = 5 newton act in the direction of the force 12 newton and its point of action apart from A by 48 cm. , 28 cm from B



10-

Answer: 3



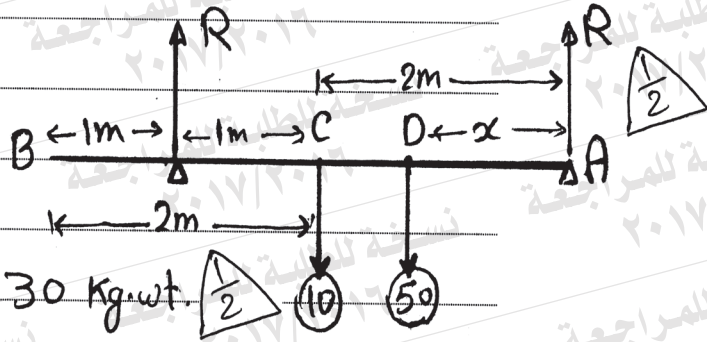
11-

Let $AD = x$ m

From equilibrium

$$2R = 10 + 50$$

$$2R = 60 \Rightarrow R = 30 \text{ Kg.wt.}$$



$M_A = \text{Zero}$

$$\therefore 50x + 10 \times 2 - 30 \times 3 = 0$$

$$50x + 20 - 90 = 0$$

$$50x = 70$$

$$x = \frac{7}{5} \text{ m}$$

\therefore The child stand at $\frac{7}{5}$ m apart of A.

12-

$$\textcircled{a} \frac{AC}{AB} = \tan 30^\circ = \frac{\sqrt{3}}{3}$$

$$\therefore AC = 210 \times \frac{\sqrt{3}}{3} = 70\sqrt{3}$$

from equilibrium:

$$\therefore \Sigma \mathcal{M} = 0$$

$$\therefore -T \cos 30^\circ + \mathcal{M} = 0$$

$$\mathcal{M} = \frac{\sqrt{3}}{2} T \quad (1)$$

$$\therefore \Sigma F_y = 0$$

$$\therefore Y + T \sin 30^\circ - 120 = 0$$

$$\frac{1}{2} T + Y = 120 \quad (2)$$

$$\therefore \Sigma \mathcal{M}_A = 0$$

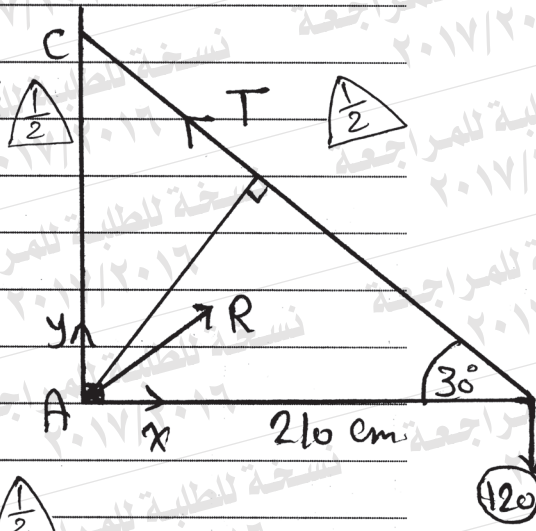
$$T \times 210 \sin 30^\circ - 120 \times 210 = 0$$

$$T \sin 30^\circ = 120 \quad \therefore T = 240 \text{ newton}$$

$$\text{From (1)} \quad \mathcal{M} = \frac{\sqrt{3}}{2} \times 240 = 120\sqrt{3} \text{ newton}$$

$$\text{From (2)} \quad Y = 120 - \frac{1}{2} \times 240 = \text{Zero}$$

$$R = 120\sqrt{3} \text{ newton in the direction of } \overrightarrow{AB}$$



1b

let $AB = 2l$ meter

$BD = x$ meter

$$\therefore x = 6$$

$$\therefore R_2 = \frac{1}{2\sqrt{3}} R_1 \quad (1) \quad \triangle \frac{1}{2}$$

$$\therefore y = 0$$

$$\therefore R_1 = 60 + 20$$

$$R_1 = 80 \text{ Kg.wt.} \quad \triangle \frac{1}{2}$$

From (1)

$$R_2 = \frac{1}{2\sqrt{3}} \times 80$$

$$R_2 = \frac{40\sqrt{3}}{3} \text{ Kg.wt.} \quad \triangle \frac{1}{2}$$

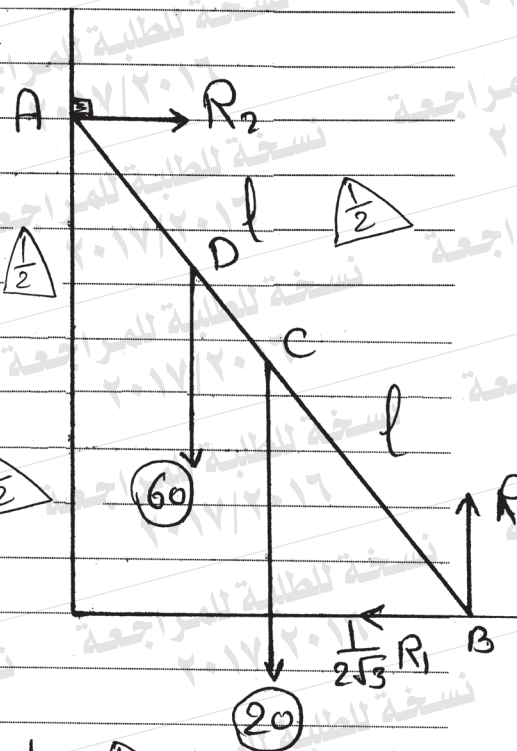
$$\therefore M_B = 0$$

$$\therefore 20 \times l \cos 60^\circ + 60 \times x \cos 60^\circ - \frac{40\sqrt{3}}{3} \times 2l \sin 60^\circ = 0 \quad \triangle \frac{1}{2}$$

$$10l + 30x - 40l = 0$$

$$30x = 30l \Rightarrow x = l \quad \triangle \frac{1}{2}$$

\therefore The maximum distance that the girl can ascend = $\frac{1}{2}$ the length of the ladder.



Answer: (b) 2



∴ DE = 12 cm

$$\therefore CE = EB = 9 \text{ cm.}$$

$$DC = 15 \text{ cm}, AC = 6\sqrt{3} \text{ cm}$$

$$M_c = 20 \times 18 - 120 \times 12$$

$$M_c = -1080 \text{ gm.wt.cm}$$


$$M_A = -50 \times 9 \times \frac{4}{5} - 60 \times 12$$

$$M_A = -1080 \text{ gm. wt. cm (2)}$$

$$M_D = 20 \times 9 - 60 \times 12 - 30\sqrt{3} \times 9 \times \frac{12}{6\sqrt{3}} = -1080 \text{ gmwt. cm}$$

From ①, ② and ③

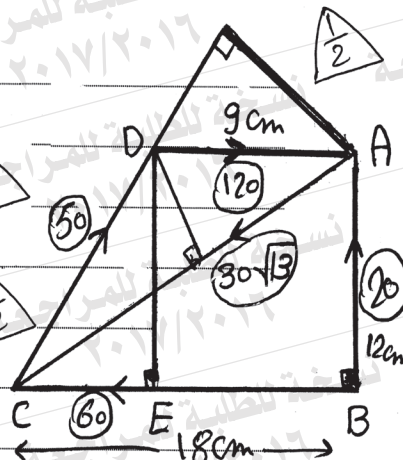
$$\therefore M_A = M_D = M_C = -1080 \text{ gm.wt.cm}$$

∴ The system is equivalent to a couple whose moment = $\pm 1080 \text{ gm.wt cm.}$ 

Another solution, $x=0, y=0$

$$M_c = -1080 \text{ gm-wt-cm}$$

∴ The system is equivalent to a couple whose moment = $\pm 1080 \text{ gm-wt cm}$



15-

From the graph: $BD = \sqrt{18^2 + 24^2}$

$$\therefore BD = 30 \text{ cm.}$$

\therefore the lamina is in an equilibrium Position

\therefore the two forces R & W form a Couple equilibrium with the given couple.

$$\therefore R = W = 20 \text{ newton.}$$

$$M_1 + M_2 = \text{zero}$$

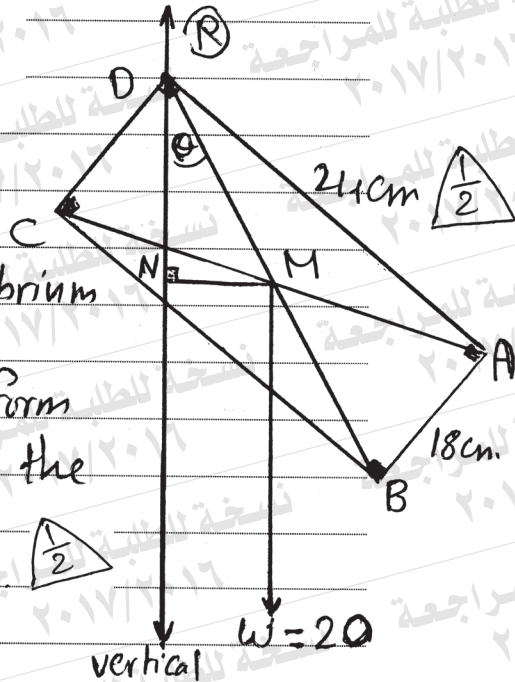
$$150 - 20 \text{ MN} = 0$$

$$\text{MN} = \frac{150}{20} = 7.5 \text{ cm}$$

$$\text{MD} = \frac{1}{2} BD = 15 \text{ cm}$$

$$\sin \theta = \frac{\text{MN}}{\text{MD}} = \frac{7.5}{15} = \frac{1}{2}$$

$$\therefore \theta = 30^\circ$$



16-

Answer ⑤ 4



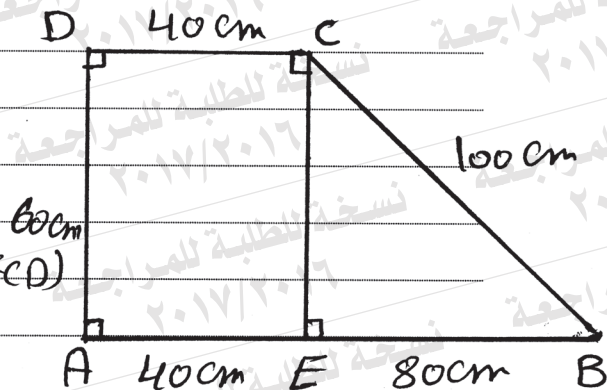
17-

Answer: ⑨ (3,3)



18-

∴ (The ratios of the weights = the ratios of the areas
= area of rectangle (AECD)
: area of (Δ ECB)



$$= 40 \times 60 : \frac{1}{2} \times 80 \times 60$$

$$= 1 : 1$$



Figure	mass	x	y
AECD	m	20	30
Δ ECB	m	$\frac{200}{3}$	20



$$x_G = \frac{20m + \frac{200}{3}m}{m + m} = \frac{130}{3} \text{ cm}$$



$$y_G = \frac{30m + 20m}{m + m} = 25 \text{ cm}$$



(انتهت الإجابة وتراعى الحلول الأخرى)